

QUALITY ASSURANCE PROJECT PLAN
Hurricane Harvey
TAGA Mobile Laboratories
Southern Texas

Prepared for:
United States Environmental Protection Agency/Environmental Response Team
Durham, North Carolina

By:
Lockheed Martin/Scientific, Engineering, Response and Analytical Service (SERAS)
Work Assignment Number: SERAS-335

Based on the Intergovernmental Data Quality Task Force Uniform
Federal Policy for Quality Assurance Project Plans
(Final Version 1.1, June 2006)

September 5, 2017

TABLE OF CONTENTS

QAPP Worksheet #1.	Title and Approval Page.....	1
QAPP Worksheet #2.	QAPP Identifying Information.....	2
QAPP Worksheet #3.	Distribution List	7
QAPP Worksheet #4.	Project Personnel Sign-Off Sheet.....	8
QAPP Worksheet #5.	Project Organizational Chart	9
QAPP Worksheet #6.	Communication Pathways	10
QAPP Worksheet #7.	Personnel Responsibilities and Qualification Table.....	11
QAPP Worksheet #8.	Special Personnel Training Requirements Table	12
QAPP Worksheet #9.	Project Scoping Session Participants Sheet.....	14
QAPP Worksheet #10.	Problem Definition	15
QAPP Worksheet #11.	Project Quality Objectives/Systematic Planning Process Statements ...	17
QAPP Worksheet #12.	Measurement Performance Criteria Table	19
QAPP Worksheet #13.	Existing Data Criteria and Limitations Table.....	20
QAPP Worksheet #14.	Summary of Project Tasks	21
QAPP Worksheet #15.	Reference Limits and Evaluation Table	22
QAPP Worksheet #16.	Project Schedule Timeline Table	24
QAPP Worksheet #17.	Sampling Design and Rationale	25
QAPP Worksheet #18.	Sampling Locations and Methods/SOP Requirements Table	26
QAPP Worksheet #19.	Analytical SOP Requirements Table.....	27
QAPP Worksheet #20.	Field Quality Control Sample Summary Table	28
QAPP Worksheet #21.	Project Sampling SOP References Table	29
QAPP Worksheet #22.	Field Equipment Calibration, Maintenance, Testing, and Inspection Table	30
QAPP Worksheet #23.	Monitoring/Analytical SOP References Table.....	33
QAPP Worksheet #24.	Analytical Instrument Calibration Table.....	34
QAPP Worksheet #25.	Analytical Instrument and Equipment Maintenance, Testing, and Inspection Table.....	35
QAPP Worksheet #26.	Sample Handling System	36
QAPP Worksheet #27.	Sample Custody Requirements	37
QAPP Worksheet #28.	QC Samples Table.....	38
QAPP Worksheet #29.	Project Documents and Records Table	40
QAPP Worksheet #30.	Analytical Services Table.....	41
QAPP Worksheet #31.	Planned Project Assessments Table	42
QAPP Worksheet #32.	Assessment Findings and Corrective Action Responses.....	43
QAPP Worksheet #33.	QA Management Reports Table.....	44
QAPP Worksheet #34.	Verification (Step I) Process Table	45
QAPP Worksheet #35.	Validation (Steps IIa and IIb) Process Table.....	46
QAPP Worksheet #36.	Validation (Steps IIa and IIb) Summary Table	47
QAPP Worksheet #37.	Usability Assessment	48

Title: Hurricane Harvey TAGA Mobile Lab QAPP
Revision Number: 0.0
Revision Date: 09/05/2017
Page: 1 of 49

QAPP Worksheet #1
Title and Approval Page

Site Name/Project Name: Hurricane Harvey
Site Location: Southern Texas (TX)

Document Title: Quality Assurance Project Plan (QAPP) for Hurricane Harvey – TAGA Mobile Laboratories – Fall 2017 Mobilization

Lead Organization: Environmental Protection Agency/Environmental Response Team (EPA/ERT)

Preparer's Name and Organizational Affiliation: Deborah Killeen, Lockheed Martin/Scientific, Engineering, Response and Analytical Services (SERAS)

Preparer's Address, Telephone Number, and E-mail Address: 2890 Woodbridge Avenue, Edison, New Jersey 08837, (732) 321-4245, deborah.a.killeen@leidos.com

Preparation Date (Month/Day/Year): September 5, 2017

Investigative Organization's Project Manager/Date: _____
Signature

Printed Name/Organization: David Mickunas/ERT Work Assignment Manager

Investigative Organization's Project QA Officer/Date: _____
Signature

Printed Name/Organization: Stephen Blaze/ERT Quality Coordinator

Lead Organization's Project Manager/Date: _____
Signature

Printed Name/Organization: Danielle McCall/SERAS Task Leader

Approval Signatures/Date: _____
Signature

Printed Name/Title: Deborah A. Killeen/SERAS QA/QC Officer

Approval Authority: SERAS

Other Approval Signatures/Date: _____
Signature

Printed Name/Title: Kevin Taylor/SERAS Program Manager

Document Numbering System: SERAS-335-DQAPP-090517

QAPP Worksheet #2
QAPP Identifying Information

Site Name/Project Name: Hurrican Harvey – TAGA Mobile Laboratories QAPP

Site Location: Southern TX

Site Number/Code:

Operable Unit:

Contractor Name: Lockheed Martin

Contractor Number: EP-W-09-031

Contract Title: SERAS

Work Assignment Number: SERAS-335

1. Identify regulatory program: Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA)
2. Identify approval entity: EPA/ERT
3. The QAPP is (select one): Generic ☒ Project Specific
4. List dates of scoping sessions that were held: NA
5. List dates and titles of QAPP documents written for previous site work, if applicable:
Title Approval Date

6. List organizational partners (stakeholders) and connection with lead organization:
ERT, EPA Region 6, Texas Commission on Environmental Quality (TCEQ)
7. List data users:
ERT, EPA Region 6, TCEQ
8. If any required QAPP elements and required information are not applicable to the project, then circle the omitted QAPP elements and required information on the attached table. Provide an explanation for their exclusions below:

WS #9 Due to the emergency response nature of this project, a project scoping meeting was not held prior to mobilization.

QAPP Worksheet #2
QAPP Identifying Information
(Continued)

Required QAPP Element(s) and Corresponding QAPP Section(s)	Required Information	Crosswalk to Related Documents
Project Management and Objectives		
2.1 Title and Approval Page	- Title and Approval Page	1
2.2 Document Format and Table of Contents 2.2.1 Document Control Format 2.2.2 Document Control Numbering System 2.2.3 Table of Contents 2.2.4 QAPP Identifying Information	- Table of Contents - QAPP Identifying Information	2
2.3 Distribution List and Project Personnel Sign-Off Sheet 2.3.1 Distribution List 2.3.2 Project Personnel Sign-Off Sheet	- Distribution List - Project Personnel Sign-Off Sheet	3 4
2.4 Project Organization 2.4.1 Project Organizational Chart 2.4.2 Communication Pathways 2.4.3 Personnel Responsibilities and Qualifications 2.4.4 Special Training Requirements and Certification	- Project Organizational Chart - Communication Pathways - Personnel Responsibilities and Qualifications Table - Special Personnel Training Requirements Table	5 6 7 8
2.5 Project Planning/Problem Definition 2.5.1 Project Planning (Scoping) 2.5.2 Problem Definition, Site History, and Background	- Project Planning Session Documentation (including Data Needs tables) - Project Scoping Session Participants Sheet - Problem Definition, Site History, and Background - Site Maps (historical and present)	NA 10
2.6 Project Quality Objectives and Measurement Performance Criteria 2.6.1 Development of Project Quality Objectives Using the Systematic Planning Process 2.6.2 Measurement Performance Criteria	- Site-Specific PQOs - Measurement Performance Criteria Table	11 12

QAPP Worksheet #2
QAPP Identifying Information
(Continued)

Required QAPP Element(s) and Corresponding QAPP Section(s)	Required Information	Crosswalk to Related Documents
2.7 Existing Data Evaluation	<ul style="list-style-type: none"> - Sources of Existing Data and Information - Existing Data Criteria and Limitations Table 	13
2.8 Project Overview and Schedule	<ul style="list-style-type: none"> - Summary of Project Tasks 	14
2.8.1 Project Overview	<ul style="list-style-type: none"> - Reference Limits and Evaluation Table 	15
2.8.2 Project Schedule	<ul style="list-style-type: none"> - Project Schedule/Timeline Table 	16
Measurement/Data Acquisition		
3.1 Sampling Tasks	<ul style="list-style-type: none"> - Sampling Design and Rationale 	17
3.1.1 Sampling Process Design and Rationale	<ul style="list-style-type: none"> - Sample Location Map 	
3.1.2 Sampling Procedures and Requirements	<ul style="list-style-type: none"> - Sampling Locations and Methods/SOP Requirements Table 	18
3.1.2.1 Sampling Collection Procedures	<ul style="list-style-type: none"> - Analytical Methods/SOP Requirements Table 	19
3.1.2.2 Sample Containers, Volume, and Preservation	<ul style="list-style-type: none"> - Field Quality Control Sample Summary Table 	20
3.1.2.3 Equipment/Sample Containers Cleaning and Decontamination Procedures	<ul style="list-style-type: none"> - Sampling SOPs 	
3.1.2.3 Field Equipment Calibration, Maintenance, Testing, and Inspection Procedures	<ul style="list-style-type: none"> - Project Sampling SOP References Table 	21
3.1.2.4 Supply Inspection and Acceptance Procedures	<ul style="list-style-type: none"> - Field Equipment Calibration, Maintenance, Testing, and Inspection Table 	22
3.1.2.6 Field Documentation Procedures		
3.2 Analytical Tasks	<ul style="list-style-type: none"> - Analytical SOPs 	
3.2.1 Analytical SOPs	<ul style="list-style-type: none"> - Analytical SOP References Table 	23
3.2.2 Analytical Instrument Calibration Procedures	<ul style="list-style-type: none"> - Analytical Instrument Calibration Table 	24
3.2.3 Analytical Instrument and Equipment Maintenance, Testing, and Inspection Procedures	<ul style="list-style-type: none"> - Analytical Instrument and Equipment Maintenance, Testing, and Inspection Table 	25
3.2.4 Analytical Supply Inspection and Acceptance Procedures		

QAPP Worksheet #2
QAPP Identifying Information
(Continued)

Required QAPP Element(s) and Corresponding QAPP Section(s)	Required Information	Crosswalk to Required Documents
3.3 Sample Collection Documentation, Handling, Tracking, and Custody Procedures 3.3.1 Sample Collection Documentation 3.3.2 Sample Handling and Tracking System 3.3.3 Sample Custody	- Sample Collection Documentation Handling, Tracking, and Custody SOPs - Sample Container Identification - Sample Handling Flow Diagram - Example Chain-of-Custody Form and Seal	26 27
3.4 Quality Control Samples 3.4.1 Sampling Quality Control Samples 3.4.2 Analytical Quality Control Samples	- QC Samples Table - Screening/Confirmatory Analysis Decision Tree	28
3.5 Data Management Tasks 3.5.1 Project Documentation and Records 3.5.2 Data Package Deliverables 3.5.3 Data Reporting Formats 3.5.4 Data Handling and Management 3.5.5 Data Tracking and Control	- Project Documents and Records Table - Analytical Services Table - Data Management SOPs	29 30
Assessment/Oversight		
4.1 Assessments and Response Actions 4.1.1 Planned Assessments 4.1.2 Assessment Findings and Corrective Action Responses	- Assessments and Response Actions - Planned Project Assessments Table - Audit Checklists - Assessment Findings and Corrective Action Responses Table	31 32
4.2 QA Management Reports	- QA Management Reports Table	33
4.3 Final Project Report		

QAPP Worksheet #2
QAPP Identifying Information
(Continued)

Required QAPP Element(s) and Corresponding QAPP Section(s)	Required Information	Crosswalk to Related Documents
Data Review		
5.1 Overview		
5.2 Data Review Steps	- Verification (Step I) Process Table	34
5.2.1 Step I: Verification		
5.2.2 Step II: Validation	- Validation (Steps IIa and IIb) Process Table	35
5.2.2.1 Step IIa Validation Activities		
5.2.2.2 Step IIb Validation Activities	- Validation (Steps IIa and IIb) Summary Table	36
5.2.3 Step III: Usability Assessment		
5.2.3.1 Data Limitations and Actions from Usability Assessment	- Usability Assessment	37
5.2.3.2 Activities		
5.3 Streamlining Data Review		
5.3.1 Data Review Steps To Be Streamlined		
5.3.2 Criteria for Streamlining Data Review		
5.3.3 Amounts and Types of Data Appropriate for Streamlining		

Title: Hurricane Harvey TAGA Mobile Lab QAPP

Revision Number: 0.0

Revision Date: 09/05/2017

Page: 7 of 49

☐ Worksheet Not Applicable (State Reason)

QAPP Worksheet #3
Distribution List

QAPP Recipients	Title	Organization	Telephone Number	Fax Number	E-mail Address	Document Number
Sella Burchette	Emergency Response (ER) Work Assignment Manager (WAM)	ERT	(732) 321-6726	(732) 321-6724	Burchette.sella@epa.gov	SERAS-335-DQAPP-090517
David Mickunas	Response WAM	ERT	(919) 541-4191	(919) 541-0496	mickunas.dave@epamail.epa.gov	SERAS-335-DQAPP-090517
Stephen Blaze	Quality Coordinator	ERT	(732) 906-6921	(732) 321-6724	blaze.stephen@epamail.epa.gov	SERAS-335-DQAPP-090517
Brian Kanupp	Senior Gas Chromatography/Mass Spectrometry (GC/MS) Chemist	SERAS	(919) 541-7671	(919) 541-0359	Brian.p.kanupp@leidos.com	SERAS-335-DQAPP-090517
Danielle McCall	Senior Mass Spectrometry /Mass Spectrometry (Sr. MS/MS) Chemist/Task Leader (TL)	SERAS	(919) 541-3508	(919) 541-0359	danielle.l.mccall@leidos.com	SERAS-335-DQAPP-090517
Youmin Hu	GC/MS Chemist	SERAS	(732) 321-4211	(732) 494-4021	yumin.hu@leidos.com	SERAS-335-DQAPP-090517
Oleks Chubatyy	Data Interpretation Specialist	SERAS	(732) 321-4249	(732) 494-4021	Oleksandr.m.chubatyy@leidos.com	SERAS-335-DQAPP-090517
William Weeks	Environmental Scientist w/Commercial Driver's License (CDL)	SERAS	(732) 321-4236	(732) 494-4021	William.v.weeks@leidos.com	SERAS-335-DQAPP-090517
Deborah Killeen	Quality Assurance/Quality Control (QA/QC) Officer	SERAS	(732) 321-4245	(732) 494-4021	deborah.a.killeen@leidos.com	SERAS-335-DQAPP-090517
Kevin Taylor	Program Manager	SERAS	(732) 321-4202	(732) 494-4021	kevin.c.taylor@leidos.com	SERAS-335-DQAPP-090517
Peter Harnett	Health & Safety Officer (HSO)	SERAS	(732) 494-4011	(732) 494-4021	Peter.b.harnett@leidos.com	SERAS-335-DQAPP-090517

Title: Hurricane Harvey TAGA Mobile Lab QAPP

Revision Number: 0.0

Revision Date: 09/05/2017

Page: 8 of 49

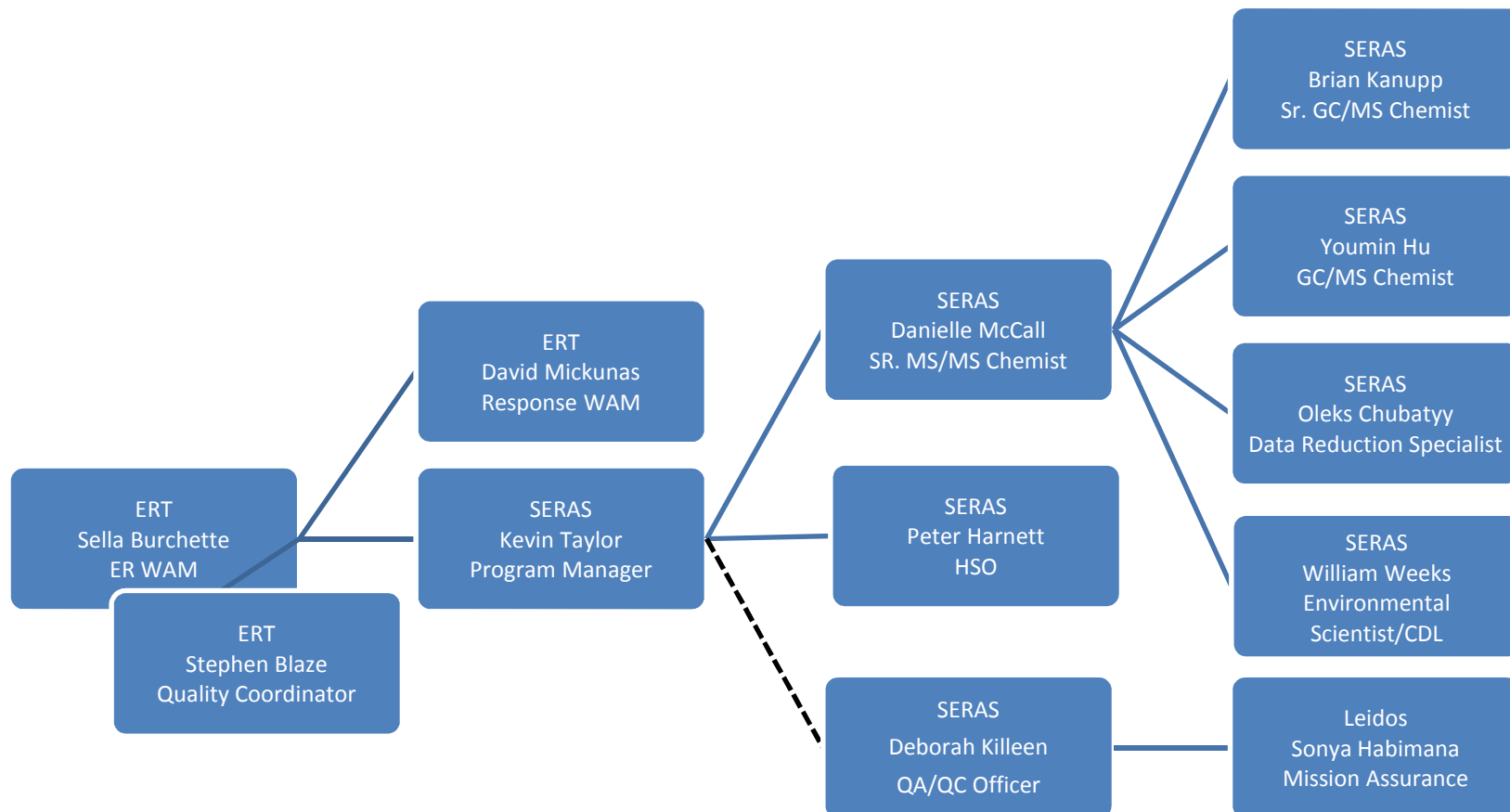
☐ Worksheet Not Applicable (State Reason)

QAPP Worksheet #4
Project Personnel Sign-Off Sheet

Organization: SERAS/ERT/EPA R6

Project Personnel	Title	Telephone Number	Signature	Date QAPP Read
Sella Burchette	ERT ER WAM	(732) 321-6726		
David Mickunas	ERT Response WAM	(919) 541-4191		
Brian Kanupp	SERAS Sr. GC/MS Chemist	(919) 541-7671		
Danielle McCall	SERAS Sr. MS/MS Chemist	(919) 541-3508		
Youmin Hu	SERAS GC/MS Chemist	(732) 321-4211		
Oleks Chubatyy	SERAS Environmental Scientist	(732) 494-4001		
Williams Weeks	SERAS Environmental Scientist	(702) 780 8040		

QAPP Worksheet #5
Project Organizational Chart



Title: Hurricane Harvey TAGA Mobile Lab QAPP

Revision Number: 0.0

Revision Date: 09/05/2017

Page: 10 of 49

☐ Worksheet Not Applicable (State Reason)

QAPP Worksheet #6
Communication Pathways

Communication Drivers	Responsible Entity	Name	Phone Number	Procedure (Timing, Pathways, etc.)
Approval of initial QAPP and any amendments	ERT WAM ERT Quality Coordinator SERAS Program Manager SERAS QA/QC Officer SERAS TL	David Mickunas Stephen Blaze Kevin Taylor Deborah Killeen Philip Solinski	(609) 865-1574 (732) 906-6921 (732) 321-4202 (732) 321-4245 (732) 321-4283	SERAS internal peer review, followed by ERT approval, implementation of changes effective only with approved QAPP or QAPP Change Form.
Nonconformance and Corrective Action	SERAS Sr. MS/MS Chemist SERAS Sr. GC/MS Chemist SERAS GC/MS Chemist ERT WAM SERAS QA/QC Officer	Danielle McCall Brian Kanupp Youmin Hu David Mickunas Deborah Killeen	(919) 541-3508 (919) 541-7671 (732) 321-4211 (609) 865-1574 (732) 321-4245	Use of the Work Assignment Field Change Form for field issues.
Posting of Deliverables to the ERT Information Management System (IMS) website	SERAS Sr. MS/MS Chemist SERAS QA/QC Officer SERAS Administrative Support	Danielle McCall Deborah Killeen Eileen Ciambotti	(919) 541-3508 (732) 321-4245 (732) 321-4255	As per work assignment, posting of deliverables to ERT- IMS website constitutes delivery to the WAM.
Work Assignment	SERAS Program Manager	Kevin Taylor	(732) 321-4202	Describes scope of work to SERAS personnel from the ERT WAM.
Health and Safety On-Site Meeting	SERAS Response Chemist	Brian Kanupp Danielle McCall Youmin Hu	(919) 541-7671 (919) 541-3508 (732) 321-4211	Describe potential site hazards, required personal protective equipment, and access to local emergency services.

QAPP Worksheet #7
Personnel Responsibilities and Qualification Table

Name	Title	Organizational Affiliation	Responsibilities	Education and Experience Qualifications
Danielle McCall	Sr. MS/MS Chemist	SERAS	Project Supervision/Site Health and Safety Officer/ Trace Atmospheric Gas Analyzer (TAGA) Monitoring / GC/MS Analysis	Minimum B.S. degree plus 14 years of related experience/Leidos Employee Files
Brian Kanupp	Sr. GC/MS Chemist	SERAS	TAGA Monitoring & GC/MS Analysis/Site Health and Safety Officer	Minimum B.S. degree plus 8 years of related experience/Leidos Employee Files
Youmin Hu	GC/MS Chemist	SERAS	GC/MS Analysis and/or TAGA Monitoring/Site Health & Safety Officer	Minimum B.S. degree plus 3 years of related experience/Leidos Employee Files
William Weeks	Environmental Scientist	SERAS	CDL Driver/Monitoring and Sampling Oversight	Minimum B.S. degree plus 3 years of related experience/Leidos Employee Files
Oleksandr Chubatyy	Information Technology/Data Reduction Specialist	SERAS	Floor Plan/ARC-GIS/ Data Reduction	Minimum B.S. degree plus 3 years of related experience/Leidos Employee Files
Deborah Killeen	QA/QC Officer	SERAS	QA & Validation Oversight/Deliverable Review	Minimum B.S. degree plus 14 years of related experience/Leidos Employee Files
Peter Harnett	HSO	SERAS	H&S Oversight/Health and Safety Plan (HASP) Review/Personal Protective Equipment (PPE) Selection	Minimum B.S. degree plus 14 years related experience/Leidos Employee Files
Kevin Taylor	Program Manager	SERAS	Program Oversight/Deliverable Review	Minimum B.S. degree plus 14 years related experience/Leidos Employee Files
David Mickunas	Response WAM	EPA/ERT	Technical Direction	EPA job-related qualifications/EPA Files
Stephen Blaze	Quality Coordinator	EPA/ERT	Project Quality Assurance	EPA job-related qualifications/EPA Files

QAPP Worksheet #8
Special Personnel Training Requirements Table

Project Function	Specialized Training – Title or Description of Course	Training Provider	Training Date	Personnel/Groups Receiving Training	Personnel Titles/ Organizational Affiliation	Location of Training Records/Certificates
Project Oversight	Task Leader	Response, Engineering and Analytical Contract (REAC)	2002	Danielle McCall	TL/SERAS	Quality Files
Advanced Air Lab Group/Project Oversight/ TAGA Monitoring/Volatile Organic Compound (VOC) Analysis	Health and Safety 8-hour Refresher	SERAS	Jan 2017	Danielle McCall	TL/SERAS	Health & Safety Files
	Demonstration of Capability	SERAS	Mar 2017	Danielle McCall	Sr. MS/MS Chemist/SERAS	Quality Files
	Annual Data Integrity Training/Peak Integration Training		Sep 2016			
TAGA Monitoring/ VOC Analysis	Health and Safety 8-hour Refresher	SERAS	Apr 2017	Brian Kanupp	Sr. GC/MS Chemist	Health & Safety Files
	Demonstration of Capability		Mar 2017			Quality Files
	Annual Data Integrity Training/Peak Integration Training		Sep 2016			
TAGA Monitoring/ VOC Analysis	Health and Safety 40-hour Training	SERAS	Sep 2016	Youmin Hu	GC/MS Chemist/SERAS	Health & Safety Files
	Demonstration of Capability		Mar 2017			Quality Files
	Annual Data Integrity Training/Peak Integration Training		Sep 2016			
Field Operations/CDL Driver	Health and Safety 8-hour Refresher	SERAS	Jul 2017	William Weeks	Environmental Scientist/SERAS	Health & Safety Files

QAPP Worksheet #8
Special Personnel Training Requirements Table

Project Function	Specialized Training – Title or Description of Course	Training Provider	Training Date	Personnel/Groups Receiving Training	Personnel Titles/ Organizational Affiliation	Location of Training Records/Certificates
Data Reduction	Health and Safety 40-hour Training	SERAS	Feb 2017	Oleks Chubatyy	Data Reduction Specialist/SERAS	Health & Safety Files
	Annual Data Integrity Training/Peak Integration Training	SERAS	Sep 2016			Quality Files
QA Oversight	Uniform Federal Policy for Quality Assurance Project Plans	Advanced Systems	Jan 2006	Deborah Killeen	QA/QC Officer/SERAS	Quality Files
QA Oversight	Changes to Environmental Laboratory Accreditation	Advanced Systems	May 2009	Deborah Killeen	QA/QC Officer/SERAS	Quality Files
QA Oversight	Introduction to Auditing – EPA QA Field Activities Procedure	ANAB	Apr 2015	Deborah Killeen	QA/QC Officer/SERAS	Quality Files
Validation	Data Review & Validation	Laboratory Data Consultants	Jan 2007	Deborah Killeen	QA/QC Officer/SERAS	Quality Files

ANAB = American National Standards Institute – American Society for Quality (ANSI-ASQ) National Accreditation Board

Title: Hurricane Harvey TAGA Mobile Lab QAPP

Revision Number: 0.0

Revision Date: 09/05/2017

Page: 14 of 49

☒ Worksheet Not Applicable (State Reason) Due to the emergency response nature of this project, a project scoping meeting was not held prior to mobilization.

QAPP Worksheet #9
Project Scoping Session Participants Sheet

Project Name: Hurricane Harvey – TAGA Mobile Labs (WA# SERAS-001) Projected Date(s) of Sampling: Starting 9/7/17 through 9/30/17 (subject to change) Project Manager: Sella Burchette/ERT ER WAM & David Mickunas, ERT Response WAM				Site Name: Hurricane Harvey Site Location: Nueces County, TX	
Date of Session: Scoping Session Purpose:					
Name	Title	Affiliation	Phone #	E-mail Address	Project Role

Comments/Decisions:

Consensus Decisions: All analytical analyses and monitoring will be performed on site.

Updates:

QAPP Worksheet #10

Problem Definition

<p>The problem to be addressed by the project:</p> <p>Hurricane Harvey is an active tropical cyclone that is causing unprecedented and catastrophic flooding in southeastern Texas. It was the first major hurricane to make landfall in the United States since Wilma in 2005, ending a record 12-year period with no hurricanes of Category 3 intensity or higher making landfall in the United States. In a four-day period, many areas received more than 40 inches (1,000 mm) of rain as the system meandered over eastern Texas and adjacent waters. With peak accumulations of 51.88 in (1,318 mm), Harvey is the wettest tropical cyclone on record in the contiguous United States. The resulting floods inundated hundreds of thousands of homes, displaced more than 30,000 people, and prompted more than 13,000 rescues.</p>
<p>The eighth named storm, third hurricane, and the first major hurricane of the 2017 Atlantic hurricane season, Harvey developed from a tropical wave to the east of the Lesser Antilles, reaching tropical storm status on August 17. The storm crossed through the Windward Islands on the following day, passing just south of Barbados and later near Saint Vincent. Upon entering the Caribbean Sea, Harvey began to weaken due to moderate wind shear and degenerated into a tropical wave north of Colombia early on August 19. The remnants were monitored for regeneration as it continued west-northwestward across the Caribbean and the Yucatán Peninsula, before redeveloping over the Bay of Campeche on August 23. Harvey then began to rapidly intensify on August 24, regaining tropical storm status and becoming a hurricane later that day. While the storm moved generally northwest, Harvey's intensification phase stalled slightly overnight from August 24–25, however Harvey soon resumed strengthening and became a Category 4 hurricane late on August 25. Hours later, Harvey made landfall near Rockport, Texas, at peak intensity.</p>
<p>Harvey has caused at least 39 (and counting) confirmed deaths; 1 in Guyana, and 38 in the United States. Catastrophic inland flooding is ongoing in the Greater Houston metropolitan area. FEMA director Brock Long called Harvey the worst disaster in Texas history, and expected the recovery to take many years. Preliminary estimates of economic losses range from \$10 billion to \$160 billion, with a large portion of losses sustained by uninsured homeowners.</p>
<p>During September 2017 and possibly longer, ERT and their SERAS contractor will provide support to Region 6 during the recovery and restoration operations in areas of Texas that were adversely impacted by Hurricane Harvey. Air monitoring, sampling and analysis operations will be conducted to assist with this mission at or adjacent to chemical/petroleum facilities that have been damaged or returning to service from Hurricane Harvey.</p>
<p>The environmental questions being asked:</p> <p>For TAGA monitoring, are tetrachloroethene (PCE), trichloroethene (TCE), dichloroethene (DCE), vinyl chloride (VCL), benzene (BNZ), toluene (TOL), and xylenes (XYL) present as contaminants in the ambient air? If so, do the VOC concentrations exceed the site specific action level established by EPA Region 6</p> <p>For Tedlar bag sampling, are PCE, TCE, 1,1,1-trichloroethane (1,1,1-TCA), 1,1-dichloroethene (1,1-DCE), cis-1,2-DCE, trans-1,2-DCE, 1,1-dichloroethane (1,1-DCA), VCL, BNZ, TOL, ethyl benzene, m&p-xylenes, o-xylene and methyl tert-butyl ether (MTBE) present as contaminants in the ambient air? If so, do the VOC concentrations exceed the site specific action level established by EPA Region 6?</p>
<p>Observations from any site reconnaissance reports:</p> <p>Not applicable</p>
<p>The possible classes of contaminants and the affected matrices:</p> <p>VOC contamination (primarily PCE, TCE, 1,1,1-TCA, DCEs, 1,1-DCA, VCL, BNZ, TOL, ethyl benzene, XYL and MTBE) of soil and water impacting ambient air.</p>
<p>The rationale for inclusion of chemical and nonchemical analyses:</p> <p>Due to the potential of hazardous materials in floodwaters, ambient air monitoring and/or sampling will be conducted in areas where the potential exists for contamination to be present. Locations, access, and scheduling will be determined, arranged, and provided by Region 6 once the situation is better understood.</p>

Title: Hurricane Harvey TAGA Mobile Lab QAPP

Revision Number: 0.0

Revision Date: 09/05/2017

Page: 16 of 49

Information concerning various environmental indicators:

Floodwaters may contain many hazards, including bacteria and other disease agents. Floating debris, closed highways and rivers at flood levels may impact locations and access. Precautions should be taken by anyone involved in cleanup activities or any others who may be exposed to flood waters. Other potential hazards include downed power lines and possible injuries inflicted by animals displaced by the floodwaters. There was a reported explosion at Arkema, a chemical facility that produces organic peroxides, 27 miles east of Houston in Crosby, TX on 8/31/17. There is a 1.5-mile radius exclusion area around the explosion site.

Project decision conditions ("If..., then..." statements):

If concentrations of ambient air exceed the project action levels developed by EPA Region 6, then EPA R6 will determine if further actions are required.

QAPP Worksheet #11 Project Quality Objectives /Systematic Planning Process Statements

Who will use the data? ERT, EPA Region 6, TCEQ
What will the data be used for? Data will be used to assess the potential exposure of contaminants in ambient air and if so, the potential risk to human health and subsequent public health advisories. Data obtained will be used to support decisions made by the EPA and determine what further actions are necessary.
What type of data is needed? (target analytes, analytical groups, field screening, on-site analytical or off-site laboratory techniques, sampling techniques) Ambient air monitoring data may be collected using a TAGA MS/MS in accordance with SERAS standard operating procedure (SOP) #1711, <i>Trace Atmospheric Gas Analyzer (TAGA) IIe</i> . Monitoring target compounds will be: PCE, TCE, DCE, VCL, BNZ, TOL, and XYL. Ambient air samples may be collected in 1-L Tedlar bags and analyzed on-site using SERAS SOP #1741, <i>Field Analysis of VOCs in Gaseous Phase Samples by GC/MS Loop Injection</i> . The VOC target compounds are PCE, TCE, 1,1,1-TCA, 1,1-DCE, cis-1,2-DCE, trans-1,2-DCE, 1,1-DCA, VCL, BNZ, TOL, ethyl benzene, m&p-xylenes, o-xylene and MTBE.
How “good” do the data need to be in order to support the environmental decision? On-site GC/MS data must meet definitive data requirements. TAGA MS/MS monitoring data must meet the following screening data requirements: (Refer to Worksheet #22) 1. Monitoring documentation in the form of field logbooks and appropriate field data sheets 2. All instrument calibration and/or performance check procedures/methods will be summarized and documented in the field, personal, or instrument log notebook. 3. Detection limits (DLs) and quantitation limits (QLs) will be determined and documented, along with the data, where appropriate
How much data are needed? (number of samples for each analytical group, matrix, and concentration) VOCs –analyzed for low level GC/MS analysis. It is not known at this time how many samples will be collected and analyzed. TAGA MS/MS – ambient stationary and mobile air monitoring to be conducted once determined by EPA Region 6.
Where, when, and how should the data be collected/generated? It is anticipated that the ambient air monitoring and sampling data will start the week of September 5, 2017 and continue for at least one month. Data will be collected in accordance with approved analytical and monitoring standard operating procedures (SOPs) (Refer to Worksheets #21, #22, & #23). The locations, access, and scheduling will be determined, arranged, and provided by Region 6.
Who will collect and generate the data? Ambient air samples will be collected in 1-L Tedlar bags either by SERAS, EPA or other contractors and relinquished for VOC analysis to the on-site TAGA Mobile Laboratory. Ambient air monitoring will be conducted using the TAGA MS/MS. Monitoring and analytical data will be collected and generated by SERAS personnel.
How will the data be reported? TAGA MS/MS monitoring data will be reported to the WAM on-site after the completion of each survey. Real-time data will be transmitted wirelessly via the VIPER data management system and viewable online through the Deployment Manager. VOC data for samples collected in Tedlar bags will be reported on a daily basis to the WAM on-site. Data will be disseminated to EPA R6 by the WAM. All deliverables will be generated in accordance to the appropriate SERAS SOP and posted to the ERT- IMS website upon completion. Posting to the ERT-IMS site will be considered as completion of the deliverable.

Title: Hurricane Harvey TAGA Mobile Lab QAPP

Revision Number: 0.0

Revision Date: 09/05/2017

Page: 18 of 49

How will the data be archived?

Hard copies of all deliverables will be stored in SERAS Central Files and e-copies will be stored on SERAS Local Area Network (LAN). Data will be imported into a Scribe database and posted to the ERT-IMS website. Data will be archived by SERAS in accordance with Administrative Procedure (AP) #34, *Archiving Data Electronic Files*.

QAPP Worksheet 12 Measurement Performance Criteria Table

Matrix	Ambient Air (Tedlar Bag)				
Analytical Group	VOC				
Concentration Level	SIM				
Sampling Procedure¹	Analytical Method/SOP²	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A) or Both (S&A)
SERAS SOP #2102 or similar procedure	SERAS SOP #1741	Precision	Relative Percent Difference (RPD) $\pm 25\%$	Laboratory Duplicates	A
		Accuracy/Bias	± 30 Percent Recovery (%R)	Laboratory Control Sample (LCS)	A
		Accuracy/Bias	$\pm 40\%$ of mean area response	Internal Standards	A
		Accuracy/Bias Contamination	< Reporting Limit (RL)	Method Blank	A
		Precision	RPD $\pm 35\%$	Collocated Samples	S & A
		Sensitivity	Limit of Detection (LOD) – 7 replicates times the Student's t-factor <RL Limit of Quantitation (LOQ) $\pm 30\%$	LOD/LOQ Study	A
		Completeness	> 90% Tedlar sampling, > 90% laboratory analysis	Data Completeness Check	S & A

¹Reference number from QAPP Worksheet #21 (see Section 3.1.2)

²Reference number from QAPP Worksheet #23 (see Section 3.2)

Title: Hurricane Harvey TAGA Mobile Lab QAPP
Revision Number: 0.0
Revision Date: 09/05/2017
Page: 20 of 49

QAPP Worksheet #13
Existing Data Criteria and Limitations Table

Existing Data	Data Source (Originating Organization, Report Title, and Date)	Data Generator(s) (Originating Org., Data Types, Data Generation/ Collection Dates)	How Data Will Be Used	Limitations on Data Use
EPA Press Releases on Hurricane Harvey	https://response.epa.gov/site/doc_list.aspx?site_id=12353	No data – informational only	As reference for QAPP development	Used to list environmental indicators

QAPP Worksheet #14 **Summary of Project Tasks**

Monitoring Tasks: SERAS personnel will use the TAGA MS/MS to perform stationary and mobile ambient air monitoring in real-time. Monitoring will be performed in accordance with SERAS SOP #1711, <i>Trace Atmospheric Gas Analyzer (TAGA) Ile</i> . Real-time preliminary results will be made available to the WAM after each monitoring event.
Sampling Tasks: Ambient air samples may be collected by SERAS personnel. The Tedlar® bag is placed into the vacuum box, which contains at least one fitting commonly referred to as a “cord grip”. A length of Teflon® tubing is passed through the cord grip fitting and attached to the bag fitting. The opposite end of the length of Teflon® tubing is attached to a sampling port, open to ambient air or connected to another orifice through which the sample may be drawn. The personal sampling pump is attached to the Tygon® tubing, which is connected to the vacuum fitting on the vacuum box. The pump evacuates the air in the vacuum box, creating a pressure differential that causes the sample to be drawn into the bag. The sample introduced into the Tedlar® bag does not pass through the pump and does not come in contact with the cord grip fitting. Typically the flow rate for the pump is 1 liter per minute (LPM) for 1-liter (L) Tedlar bag sampling. The samples will be collected at locations designated by the WAM and/or EPA Region 6 in accordance with SERAS SOP #2102, <i>Tedlar Bag Sampling</i> .
Analysis Tasks: VOC analysis of all samples collected in 1-L Tedlar bags will be performed on-site in the TAGA Mobile Laboratory using a GC/MS in accordance with SERAS SOP #1741, <i>Field Analysis of VOCs in Gaseous Phase Samples by GC/MS Loop Injection</i> .
Quality Control Tasks: QC samples are described in <u>Worksheet #20</u> . Analytical QC samples are outlined in Worksheets #12 and #28.
Existing Data: May be used as reference in development of work plan (WP), Health and Safety Plan (HASP), and QAPP.
Data Management Tasks: Real-time data will be transmitted wirelessly via the VIPER data management system and viewable online through the Deployment Manager. All sampling locations will be identified by a field assigned number. Field sampling data will be recorded on field data sheets or in field books. All samples will be delivered under chain of custody (COC) to the on-site laboratory. All sampling and monitoring information and data will be uploaded into Scribe and posted to the ERT-IMS website.
Documentation and Records: All documentation will be recorded in accordance with SERAS SOP #4001, <i>Logbook Documentation</i> and SOP #2002, <i>Sample Documentation</i> . Documents and records that may be generated during this project include: WP, QAPP, HASP, Field Laboratory Logbooks, Site Map, COC Records, Air Sampling Worksheets, Scribe Database, TAGA Analytical Report, GC/MS Analytical Report, Trip Report, and Field Change Forms, if required. A TAGA Analytical Report will be prepared in accordance with SERAS SOP #4014, <i>TAGA Analytical Report Preparation</i> . A final GC/MS Analytical Report will be prepared in accordance with SERAS SOP #4015, <i>GC/MS Analytical Report Preparation</i> .
Assessment/Audit Tasks: No performance audit of field operations is anticipated for this project. The tasks associated with this QAPP are assessed using peer reviews and management system reviews. Peer review enables the chemist to identify and correct reporting errors before reports are submitted. Management system reviews establish compliance with prevailing management structure, policies and procedures, and ensures that the required data are obtained.
Data Review Tasks: All project deliverables will receive an internal peer review prior to release, per guidelines established in the SERAS AP #22, <i>Peer Review of SERAS Deliverables</i> .

QAPP Worksheet 15-1 **Reference Limits and Evaluation Table**

Matrix: Ambient Air

Analytical Group: VOC (TAGA Monitoring)

Analyte	CAS Number	Project Action Limit ¹ (ppbv*)	Project Quantitation Limit (ppbv)	Analytical Method SERAS SOP #1711		Achievable Laboratory Limits	
				MDLs* (ppbv)	Method QLs* (ppbv)	MDLs (ppbv) ²	QLs (ppbv)
Trichloroethene	79-01-6	0.40	0.50	NS	NS	0.10	0.50
Tetrachloroethene	127-18-4	6.0	0.50	NS	NS	0.10	0.50
Dichloroethenes	75-35-4 (1,1-DCE) 156-59-2 (cis-1,2-DCE) 156-60-5 (trans-1,2-DCE)	200**	0.50	NS	NS	0.10	0.50
Vinyl Chloride	75-01-4	500	2.5	NS	NS	0.50	2.5
Benzene	71-43-2	9.0	0.50	NS	NS	0.10	0.50
Toluene	108-88-3	2000	0.50	NS	NS	0.10	0.50
Xylenes	1330-20-7	5000#	1.0	NS	NS	0.20	1.0

¹ Based on ASTDR Minimal Risk Levels (MRLs) for acute inhalation exposure - https://www.atsdr.cdc.gov/mrls/pdfs/atsdr_mrls.pdf - June 2017

² Detection Limits will be determined daily and may be elevated above the project action limit (PAL) due to atmospheric conditions; likewise, the QLs will also be higher.

ppbv = parts per billion by volume

* NS = Not specified

**Based on the acute inhalation number for trans-1,2-DCE, which is the highest for 1,1-DCE and trans-1,2-DCE – there is no inhalation number for cis-1,2-DCE.

#Based on the acute inhalation number for ethylbenzene, which is the highest of m-&p-xylenes, o-xylene and ethyl benzene

QAPP Worksheet 15-2 **Reference Limits and Evaluation Table**

Matrix: Ambient Air (Tedlar Bag)

Analytical Group: VOC

Concentration Level: Low Level SIM

Analyte	CAS Number	Project Action Limit ¹ (ppbv*)	Project Quantitation Limit (ppbv)	Analytical Method		Achievable Laboratory Limits	
				MDLs ² (ppbv)	Method QLs (ppbv)	MDLs (ppbv ³)	QLs (ppbv)
Tetrachloroethene	127-18-4	6.0	0.50	0.75	0.50 ppbv	0.051	0.50
Trichloroethene	79-01-6	0.40#	0.50	0.45	0.50 ppbv	0.054	0.50
1,1-Dichloroethene	75-35-4	20*	0.50	NS	0.50 ppbv	0.083	0.50
cis-1,2-Dichloroethene	156-59-2	NS	0.50	NS	0.50 ppbv	0.068	0.50
trans-1,2-Dichloroethene	156-60-5	200	0.50	NL	0.50 ppbv	0.091	0.50
Vinyl chloride	75-01-4	500	0.50	0.33	0.50ppbv	0.52	0.50
Methyl tert-Butyl Ether (MTBE)	1634-04-4	2000	0.50	NL	0.50ppbv	0.18	0.50
1,1-Dichloroethane	75-34-3	NS	0.50	0.27	0.50ppbv	0.060	0.50
1,1,1-Trichloroethane	71-55-6	2000	0.50	0.62	0.50ppbv	0.051	0.50
Benzene	71-43-2	9.0	0.50	0.34	0.50 ppbv	0.084	0.50
Toluene	108-88-3	2000	0.50	0.99	0.50 ppbv	0.15	0.50
Ethyl Benzene	100-41-4	5000	0.50	0.27	0.50 ppbv	0.11	0.50
m,p-xylenes	108-38-3/106-42-3	2000**	0.50	0.76	0.50 ppbv	0.12	0.50
o-xylene	95-47-6	2000**	0.50	0.57	0.50 ppbv	0.12	0.50

¹ Based on ATSDR Minimal Risk Levels (MRLs) for acute inhalation exposure - https://www.atsdr.cdc.gov/mrls/pdfs/atsdr_mrls.pdf - June 2017

²As specified in EPA Method TO-15

³Based on LOD Study for Truck 3064 dated 8/22/2016

NS = Not specified NL = Not listed ppbv = parts per billion by volume

*No acute inhalation number available – used intermediate inhalation number

**Reflects the acute inhalation number for mixed xylenes

#Results obtained between the MDL and RL will be qualified estimated “J”.

Title: Hurricane Harvey TAGA Mobile Lab QAPP
Revision Number: 0.0
Revision Date: 09/05/2017
Page: 24 of 49

QAPP Worksheet #16
Project Schedule Timeline Table

Activities	Organization	Dates (MM/DD/YY)		Deliverable	Deliverable Due Date
		Anticipated Date(s) of Initiation	Anticipated Date of Completion		
TAGA Mobile Laboratory Mobilization	SERAS	09/02/17	09/05/17	No	Not applicable
TAGA MS/MS Monitoring	SERAS	09/05/17	09/30/17	Yes	Draft results available immediately after on-site monitoring and through Viper
On-site GC/MS analysis	SERAS	09/05/17	09/30/17	Yes	Draft results available at the end of each day
GC/MS Analytical Report	SERAS	10/01/17	One month after demobilization	Final GC/MS Analytical Report	11/01/17
TAGA Analytical Report	SERAS	10/01/17	One month after demobilization	Final TAGA Analytical Report	11/01/17

QAPP Worksheet #17
Sampling Design and Rationale

Describe and provide a rationale for choosing the sampling approach (e.g., grid system, biased statistical approach):
EPA Region 6 personnel will determine where stationary and/or mobile monitoring and/or ambient air sampling will be conducted based on logistics, road access and prioritization of locations. Monitoring and sampling will be judgmental in nature based on potential exposure.
Describe the sampling design and rationale in terms of what matrices will be sampled, what analytical groups will be analyzed and at what concentration levels, the sampling locations (including QC, critical, and background samples), the number of samples to be taken, and the sampling frequency (including seasonal considerations) [May refer to map or Worksheet #18 for details].
Ambient air will be monitored and/or sampled. At this time, it is uncertain how many samples will be collected and/or analyzed. Mobile and stationary monitoring may assist in the determination of sample locations.

Title: Hurricane Harvey TAGA Mobile Lab QAPP
Revision Number: 0.0
Revision Date: 09/05/2017
Page: 26 of 49

QAPP Worksheet #18
Sampling Locations and Methods/SOP Requirements Table

Sampling Location/ID Number*	Matrix	Depth ()	Analytical Group	Concentration Level	Number of Samples (identify field duplicates)**	Sampling SOP Reference ¹	Rationale for Sampling Location ²
TBD	Ambient Air in Tedlar Bag	NA	VOC	Low Level SIM	TBD	2102	Judgmental

¹Specify the appropriate reference letter or number from the Analytical SOP References table (Worksheet #21)

²Refer to Worksheet #17

TBD = To be determined

NA = Not applicable

QAPP Worksheet #19
Analytical SOP Requirements Table

Matrix	Analytical Group	Concentration Level	Analytical and Preparation Method/SOP Reference ¹	Sample Volume	Containers (number, size, and type)	Preservation Requirements (chemical, temperature, light protected)	Maximum Holding Time (preparation/analysis)
Ambient Air	VOC	Low Level SIM	1741	1-L	1-L Tedlar Bag	Place in dark plastic bag	24 Hours

¹Specify the appropriate reference letter or number from the Analytical SOP References table (Worksheet #23).

Title: Hurricane Harvey TAGA Mobile Lab QAPP

Revision Number: 0.0

Revision Date: 09/05/2017

Page: 28 of 49

☐ Worksheet Not Applicable (State Reason)

QAPP Worksheet #20
Field Quality Control Sample Summary Table

Matrix	Analytical Group	Concentration Level	Analytical and Preparation SOP Reference¹	No. of Sampling Locations	No. of Field Duplicate Pairs	Inorganic No. of MS	No. of Trip Blanks	No. of Equip. Blanks	No. of PT Samples	Total No. of Samples to Lab
Ambient Air	VOC	Low Level SIM	1741	TBD	TBD	NA	NA	NA	NA	TBD

¹Specify the appropriate reference letter or number from the Analytical SOP References table (Worksheet #23)

NA = Not applicable

TBD = To be determined

Title: Hurricane Harvey TAGA Mobile Lab QAPP
Revision Number: 0.0
Revision Date: 09/05/2017
Page: 29 of 49

QAPP Worksheet #21
Project Sampling SOP References Table

Reference Number	Title, Revision Date and/or Number	Originating Organization	Equipment Type	Modified for Project Work? (Check if yes)	Comments
2002	<i>Sample Documentation</i> , Rev. 1.0, 1/4/16	SERAS	NA		
2005	<i>Quality Assurance/Quality Control Samples</i> , Rev. 0.0, 8/11/94	SERAS	NA		
2102	<i>Tedlar Bag Sampling</i> , Rev. 1.1 06/30/17	SERAS	1-L Tedlar Bag		
4001	<i>Logbook Documentation</i> , Rev. 1.0, 10/31/16	SERAS	NA		
4005	<i>Chain of Custody Procedures</i> , Rev. 2.0, 1/30/16	SERAS	NA		

NA = Not applicable

SOPs can be found at https://www.epaossc.org/site/site_profile.aspx?site_id=2107

QAPP Worksheet #22
Field Equipment Calibration, Maintenance, Testing, and Inspection Table

Field Equipment	Calibration Activity	Maintenance Activity	Testing Activity	Inspection Activity	Frequency	Acceptance Criteria	Corrective Action	Responsible Person	SOP Reference ¹
Electronic Flow Meter	Calibrated by manufacturer	NA	NA	NA	Annual	Manufacturer's Specifications	Recalibrate	Manufacturer or designated vendor	Manufacturer's Operating Guide
Mass Flow Controller	Calibrated by operator	NA	Calibration Monitoring	Proper flow being achieved	Daily or when needed	Within 5% of reference standard throughout the range	Recalibrate	Operator	1711
TAGA MS/MS [‡]	Minimum six point calibration for all target compounds	Check gas and standard supply daily, optimize tuning parameters, adjust peak widths, and ensure correct mass assignments	VOC Analysis	Ion source, first quadrupole rods, check needle valve, tighten Swagelok ¼" nuts to injection port	Minimum one to two standard calibrations per monitoring day.	Correlation coefficient (r) of each ion pair is greater than or equal to 0.90	Inspect system for problems; perform maintenance (i.e. source and rod cleaning, etc.). Re-tune and rerun calibration	Analyst	1711
Dwyer Rotameter	Calibrated by manufacturer	NA	NA	NA	Annual	Manufacturer's Specifications	Recalibrate	Manufacturer or designated vendor	Manufacturer's Operating Guide
Gilibrator calibration bubble meter	Calibrated by manufacturer	NA	NA	NA	Annual	Manufacturer's Specifications	Recalibrate	Manufacturer or designated vendor	Manufacturer's Operating Guide

¹Specify the appropriate reference letter or number from the Project Sampling SOP References table (Worksheet #21 and #23).

NA = Not applicable

[‡] See TAGA QA/QC Protocol Table below.

QA/QC Protocols for TAGA Monitoring (SOP #1711)

Instrument	Procedure	Frequency	Acceptance Criteria	Corrective Action (CA)	Person Responsible for CA	SOP Reference
TAGA MS/MS	Calibrate sample air flow (SAF)	First day of monitoring activities	1200 to 1500 mL/sec based on environmental conditions	Adjust span on MKS box	Analyst	1711
TAGA MS/MS	Calibrate mass flow controller (MFC)	First day of monitoring activities	The maximum flow rate should be adjusted to be within 2% of desired flow. After ten readings for each of three flows, maximum error should be below $\pm 5\%$.	Adjust span on MKS box	Analyst	1711
TAGA MS/MS	Standard calibration	Beginning (BOD) and end (EOD) of each monitoring day. Depending on environmental and instrumentation factors, calibrations may be repeated prior to any monitoring survey.	Correlation coefficient (r) of each ion pair is greater than or equal to 0.90	Inspect system for problems; re-tune, perform maintenance (i.e. ion source cleaning, rod cleaning, etc.). Rerun calibration	Analyst	1711
TAGA MS/MS	Transport Efficiency	Beginning and end of each monitoring day	85% efficiency	Inspect Teflon [®] hose for leaks or kinks	Analyst/Field personnel	1711

QA/QC Protocols for TAGA Monitoring (SOP #1711)

Instrument	Procedure	Frequency	Acceptance Criteria	Corrective Action (CA)	Person Responsible for CA	SOP Reference
TAGA MS/MS	Response Factor (RF)/Intermediate Response Factor (IRF)	Calculated from each calibration for each ion pair	IRF is calculated between a pair of calibrations. A percent difference (%D) of the compound's RF is calculated between pairs of calibrations. If %D is greater than 25%, the IRF must be used to quantify the target compound.	Not applicable	Analyst	1711
TAGA MS/MS	Detection and Quantitation Limits	Start of each monitoring day	Project specific, calculated using initial ambient air data segment collected at the beginning of BOD calibration and the RF or IRF	Inspect system for problems; re-tune, perform maintenance (i.e. ion source cleaning, rod cleaning, etc.). Rerun calibration	Analyst	1711
TAGA MS/MS	30 mL spike	One minute data segment collected at end of each monitoring survey	Its equivalent concentration in ppbv (approximately 7 ppbv)	Inspect system for problems; re-tune, perform maintenance (i.e. ion source cleaning, rod cleaning, etc.). Rerun calibration	Analyst	1711

Title: Hurricane Harvey TAGA Mobile Lab QAPP
Revision Number: 0.0
Revision Date: 09/05/2017
Page: 33 of 49

QAPP Worksheet #23
Monitoring/Analytical SOP References Table

Reference Number	Title, Revision Date, and/or Number	Definitive or Screening Data	Analytical Group	Instrument	Organization Performing Analysis	Modified for Project Work?
1711	Trace Atmospheric Gas Analyzer (TAGA) IIE Operation, Rev. 0.1 06/03/2016	Screening	VOC	TAGA MS/MS	ERT/SERAS Mobile Laboratory	<input type="checkbox"/>
1741	Field Analysis of VOCs in Gaseous Phase Samples by GC/MS Loop Injection, Rev. 1.1 6/25/2015	Definitive	VOC	GC/MS	ERT/SERAS Mobile Laboratory	<input type="checkbox"/>

SOPs can be found at https://www.epaossc.org/site/site_profile.aspx?site_id=2107

QAPP Worksheet #24
Analytical Instrument Calibration Table

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action (CA)	Person Responsible for CA	SOP Reference ¹
GC/MS	Instrument Performance Check	Every 24 hours	Within the ion abundance criteria listed in the method	Re-tune and recalibrate	Analyst	1741
GC/MS	Initial calibration (IC), minimum 5-points for all analytes	Initially prior to sample analysis. After changes to instrument and when instrument does not meet method criteria.	Relative standard deviation (RSD) \leq 30%	Inspect system for problems; perform maintenance (i.e. ion source cleaning, column replacement, etc.), check calibration standards. Rerun IC, reanalyze affected samples	Analyst	1741
GC/MS	Initial Calibration Verification (ICV)	Immediately following an initial calibration	Percent recovery (%R) within $\pm 30\%$	Rerun ICV. If needed, inspect system for problems, perform maintenance (i.e. ion source cleaning, column replacement, etc.), rerun IC	Analyst	1741
GC/MS	Daily Continuing Calibration Check (CCC)	Every 24 hours	Percent difference (%D) = $\pm 30\%$	Rerun CCC. If needed, inspect system for problems, perform maintenance (i.e. ion source cleaning, column replacement, etc.), rerun IC	Analyst	1741
GC/MS	Daily Low Level Continuing Calibration Check (LLCCC)	Every 24 hours	Percent difference (%D) = $\pm 50\%$	Rerun LLCCC. If needed, inspect system for problems, perform maintenance (i.e. ion source cleaning, column replacement, etc.), rerun IC	Analyst	1741

¹Specify the appropriate reference letter or number from the Analytical SOP References table (Worksheet #23)

Title: Hurricane Harvey TAGA Mobile Lab QAPP

Revision Number: 0.0

Revision Date: 09/05/2017

Page: 35 of 49

QAPP Worksheet #25

Analytical Instrument and Equipment Maintenance, Testing, and Inspection Table

Instrument/ Equipment	Maintenance Activity	Testing Activity	Inspection Activity	Frequency	Acceptance Criteria	Corrective Action	Responsible Person	SOP Reference¹
GC/MS	Check gas supply daily, bake or change trap as needed, manual tune if 4-Bromofluorobenzene (BFB) not within criteria, cut or change column, change septum as needed.	VOC Analysis	Check ion source, gas supply, septum seal, vacuum, trap	Prior to sample analysis or when instrument does not meet criteria	BFB criteria achieved, Relative standard deviation (RSD) = \leq 30% in the IC	Recalibrate and/or perform necessary instrument maintenance, check calibration standards, re-analyze affected samples.	Analyst	1741

¹Specify the appropriate reference letter or number from Analytical SOP References table (Worksheet #23)

QAPP Worksheet #26
Sample Handling System

SAMPLE COLLECTION, PACKAGING, AND SHIPMENT
Sample Collection (Personnel/Organization): SERAS and/or other contractor personnel
Sample Packaging (Personnel/Organization): NA
Coordination of Shipment (Personnel/Organization): NA
Type of Shipment/Carrier: NA
SAMPLE RECEIPT AND ANALYSIS
Sample Receipt (Personnel/Organization): SERAS Personnel, GC/MS Chemist
Sample Custody and Storage (Personnel/Organization): SERAS Personnel, GC/MS Chemist
Sample Preparation (Personnel/Organization): NA
Sample Determinative Analysis (Personnel/Organization): SERAS Personnel, GC/MS Chemist
SAMPLE ARCHIVING
Field Sample Storage (No. of days from sample collection): Samples will be consumed within 24 hours of collection
Sample Extract/Digestate Storage (No. of days from extraction/digestion): NA
Biological Sample Storage (No. of days from sample collection): NA
SAMPLE DISPOSAL
Personnel/Organization: NA
Number of Days from Analysis: NA

NA = Not applicable

QAPP Worksheet #27 **Sample Custody Requirements**

<p>Field Sample Custody Procedures (sample collection, packaging, shipment, and delivery to laboratory):</p> <p>Samples collected in Tedlar bags by SERAS and/or other contractor personnel will be relinquished under COC to the TAGA Mobile Laboratory in accordance with SERAS SOP # 4005, <i>Chain of Custody Procedures</i> or as per another contractor's COC procedures. Scribe will be used for sample management, as well as, generation of sample documentation, such as COC records.</p> <p>Procedures outlined in SERAS SOP #2002, <i>Sample Documentation</i> and SOP #4001, <i>Logbook Documentation</i> will be applied for sample collection by SERAS personnel (refer to Worksheet #21).</p>
<p>Laboratory Sample Custody Procedures (receipt of samples, archiving, and disposal):</p> <p>SERAS personnel in the TAGA Mobile Laboratory will accept custody of the samples; check them for discrepancies, integrity, etc., before relinquishing for analysis. The Task Leader will be notified of any problems. No samples will be archived at the laboratory.</p>
<p>Sample Identification Procedures:</p> <p>Each sample will be identified with a unique identification number at the time of collection. The number will be listed on the label of every sample container collected at a given location. A unique laboratory identification number will be assigned to each sample during on-site analysis at the Mobile Laboratory</p> <p>Procedures outlined in SERAS SOP #2002 will be applied (Refer to Worksheet #21).</p>
<p>Chain-of-custody Procedures:</p> <p>Chain-of-custody records will be generated for all samples submitted for analysis using Scribe database software. Procedures outlined in SERAS SOP #4005, <i>Chain of Custody Procedures</i> will be applied.</p>

QAPP Worksheet #28
QC Samples Table

Matrix	Ambient Air (Tedlar Bag)					
Analytical Group	VOC					
Concentration Level	SIM					
Sampling SOP	2102					
Analytical Method/ SOP Reference	1741					
Sampler's Name	TBD					
Field Sampling Organization	SERAS/Region 6 Contractor					
Analytical Organization	ERT/SERAS Mobile Laboratory					
No. of Sample Locations	TBD					
QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Internal Standard	Each sample	±40% of daily calibration Internal Standard (IS) response	Re-analyze sample	Analyst	Precision/Accuracy/ Bias	±40% of daily calibration IS response
Lab Replicates	10%	RPD ±25%	Reanalyze and/or flag data	Analyst	Precision	RPD ±25%
Laboratory Control Sample (LCS)	1 per 24-hour clock	± 30% R	Clean, repair, re- analyze	Analyst	Accuracy/Bias	± 30% R
Method Blank	1/24-hour clock	< Reporting Limit (RL)	Clean, repair, re- analyze	Analyst	Accuracy/Bias Contamination	< RL
Limit of Detection (LOD)/Limit of Quantitation (LOQ) Study	Annual	LOD = < RL LOQ = ±30% or within control chart limits	Clean, repair, re- analyze.	Analyst	Sensitivity	LOD = < RL LOQ = ±30% or within control chart limits

Title: Hurricane Harvey TAGA Mobile Lab QAPP
Revision Number: 0.0
Revision Date: 09/05/2017
Page: 39 of 49

QAPP Worksheet #28
QC Samples Table

Matrix	Ambient Air (Tedlar Bag)					
Analytical Group	VOC					
Concentration Level	SIM					
Sampling SOP	2102					
Analytical Method/ SOP Reference	1741					
Sampler's Name	TBD					
Field Sampling Organization	SERAS/Region 6 Contractor					
Analytical Organization	ERT/SERAS Mobile Laboratory					
No. of Sample Locations	TBD					
QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Field Duplicates	TBD	NA	Document in final deliverable	Analyst	Precision	RPD $\pm 35\%$

NA = Not applicable, TBD = To be determined

Title: Hurricane Harvey TAGA Mobile Lab QAPP
Revision Number: 0.0
Revision Date: 09/05/2017
Page: 40 of 49

QAPP Worksheet #29
Project Documents and Records Table

Sample Collection Documents and Records	On-site Analysis Documents and Records	Off-site Analysis Documents and Records	Data Assessment Documents and Records	Other
Chain of custody records Sample Labels Tedlar Sampling Worksheets Field Change Form (if necessary)	Instrument Run Logs Preventive Maintenance Logs Instrument Printouts Internal COC Records Analytical Results Monitoring Results	NA	UFP-QAPP Verification Checklist	TAGA Final Report GC/MS Analytical Report Scribe Database QAPP HASP WP

NA = Not Applicable

Title: Hurricane Harvey TAGA Mobile Lab QAPP
Revision Number: 0.0
Revision Date: 09/05/2017
Page: 41 of 49

QAPP Worksheet #30
Analytical Services Table

Matrix	Analytical Group	Concentration Level	Sample Location/ID Numbers	Analytical SOP	Data Package Turnaround Time	Laboratory/Organization (Name and Address, Contact Person and Telephone Number)	Backup Laboratory/Organization (Name and Address, Contact Person and Telephone Number)
Ambient Air	VOC	Low	Refer to WS #18	SERAS SOP #1741	1 month	ERT/SERAS Mobile Laboratory Durham, North Carolina Attn.: Dave Mickunas	NA

QAPP Worksheet #31
Planned Project Assessments Table

Assessment Type	Frequency	Internal or External	Organization Performing Assessment	Person(s) Responsible for Performing Assessment (Title and Organizational Affiliation)	Person(s) Responsible for Responding to Assessment Findings (Title and Organizational Affiliation)	Person(s) Responsible for Identifying and Implementing Corrective Actions (CA) (Title and Organizational Affiliation)	Person(s) Responsible for Monitoring Effectiveness of CA (Title and Organizational Affiliation)
Laboratory Accreditation Audit	Every 2 years	External	NJDEP	NELAP Accreditation Agency	Deborah Killeen, QA/QC Officer, SERAS	Danielle McCall, Sr. MS/MS Chemist, ERT/SERAS Mobile Laboratory (RTP Office)	NELAP Accreditation Agency
Performance Evaluation Sample	Annual	External	Environmental Resource Associates (PT Provider)	NJDEP	Deborah Killeen, QA/QC Officer, SERAS	Danielle McCall, Sr. MS/MS Chemist, ERT/SERAS Mobile Laboratory (RTP Office)	Deborah Killeen, QA/QC Officer, SERAS
Mobile Laboratory Audit	Annual	Internal	SERAS	Deborah Killeen, QA/QC Officer, SERAS	Danielle McCall, Sr. MS/MS Chemist, ERT/SERAS Mobile Laboratory (RTP Office)	Danielle McCall, Sr. MS/MS Chemist, ERT/SERAS Mobile Laboratory (RTP Office)	Deborah Killeen, QA/QC Officer, SERAS

Title: Hurricane Harvey TAGA Mobile Lab QAPP

Revision Number: 0.0

Revision Date: 09/05/2017

Page: 43 of 49

QAPP Worksheet #32
Assessment Findings and Corrective Action Responses

Assessment Type	Nature of Deficiencies Documentation	Individual(s) Notified of Findings (Name, Title, Organization)	Timeframe of Notification	Nature of Corrective Action Response Documentation	Individual(s) Receiving Corrective Action Response (Name, Title, Org.)	Timeframe for Response
Field Observations/ Deviations from Work Plan	Logbook	Danielle McCall/TL, SERAS	Immediately	Field Change Form	Danielle McCall /TL, SERAS	Within 24 hours of change
Lab Performance Audits	Audit report	Deborah Killeen, SERAS QA/QC Officer	Within 30 days	Corrective Action Plan	NELAP Accreditation Agency	Within 30 days
Peer Review	In the deliverable	Danielle McCall/TL, SERAS	Prior to deliverable due date	Comments directly in the deliverable	Danielle McCall/TL, SERAS	Prior to deliverable due date
Internal Lab Performance Audits	Audit report	Danielle McCall/TL, SERAS	Within 45 days	Corrective Action Plan	Deborah Killeen, QA/QC Officer, SERAS	Within 45 days

Title: Hurricane Harvey TAGA Mobile Lab QAPP

Revision Number: 0.0

Revision Date: 09/05/2017

Page: 44 of 49

QAPP Worksheet #33
QA Management Reports Table

Type of Report	Frequency (daily, weekly monthly, quarterly, annually, etc.)	Projected Delivery Date(s)	Person(s) Responsible for Report Preparation (Title and Organizational Affiliation)	Report Recipient(s) (Title and Organizational Affiliation)
Technical Report	Monthly	20 th of the month following performance period	TL/SERAS	ERT Project Officer and WAM
QA Report	Quarterly	February, May, August, November	QA/QC Officer/SERAS	ERT Project Officer and Quality Coordinator

Title: Hurricane Harvey TAGA Mobile Lab QAPP
Revision Number: 0.0
Revision Date: 09/05/2017
Page: 45 of 49

QAPP Worksheet #34
Verification (Step I) Process Table

Verification Input	Description	Internal/ External	Responsible for Verification (Name, Organization)
Chain of Custody Record	Reviewed by Field Sampling Personnel in field and prior to final analytical report preparation	Internal	SERAS
TAGA and GC/MS Analytical Data	Reviewed for accuracy	Internal	Peer Review Team
Trip Report	Reviewed for accuracy	Internal	Peer Review Team
Completeness Check	Review of Planning Documents, Analytical Data package, Sampling Documents and External Reports, as applicable, using the UFP-QAPP Checklist	Internal	SERAS TL

Title: Hurricane Harvey TAGA Mobile Lab QAPP

Revision Number: 0.0

Revision Date: 09/05/2017

Page: 46 of 49

☐ Worksheet Not Applicable (State Reason)

QAPP Worksheet #35
Validation (Steps IIa and IIb) Process Table

Step IIa/IIb	Validation Input	Description	Responsible for Validation (Name, Organization)
IIa	SOPs	Ensure that the procedures outlined in the QAPP were followed and any deviations noted	SERAS TL, WAM
IIa	COC Records	Examine COC records and match with requested analyses.	SERAS Sr. MS/MS Chemist SERAS QA/QC Officer
IIa	Lab Data Package	Examine packages against COC records (holding times, sample handling, methods, sample identifications, qualifiers).	SERAS Sr. MS/MS Chemist SERAS QA/QC Officer

Title: Hurricane Harvey TAGA Mobile Lab QAPP

Revision Number: 0.0

Revision Date: 09/05/2017

Page: 47 of 49

☐ Worksheet Not Applicable (State Reason)

QAPP Worksheet #36
Validation (Steps IIa and IIb) Summary Table

Step IIa/IIb	Matrix	Analytical Group	Concentration Level	Validation Criteria	Data Validator (title and organizational affiliation)
IIb	Ambient Air (Tedlar Bag)	VOC	Low	Draft SOP #1021, <i>Data Validation for Routine Volatile Organic Compounds in Air by TO-15 Analysis</i>	SERAS QA/QC Officer

QAPP Worksheet #37 Usability Assessment

Summarize the usability assessment process and all procedures, including interim steps and any statistics, equations, and computer algorithms that will be used: See below
Describe the evaluative procedures used to assess overall measurement error associated with the project: See below
Identify the personnel responsible for performing the usability assessment: SERAS, ERT, EPA Region 6
Describe the documentation that will be generated during usability assessment and how usability assessment results will be presented so that they identify trends, relationships (correlations), and anomalies: EPA Region 6

-Precision: Results of laboratory duplicates will be assessed during data validation and data will be qualified according to the data validation procedures cited in worksheet #36. If analyzed, field duplicates will be assessed during by matrix using the RPD for each pair of results above the QL for the performed analyses. RPD acceptance criteria, presented in worksheet #12, will be used to access field sampling precision. A discussion summarizing the results of laboratory and field precision and any limitations on the use of the data will be described.

-Accuracy/Bias Contamination: Results for all laboratory blanks will be assessed as part of the data validation. During the data validation process, the validating personnel will qualify the data following the procedures described on worksheet #36. A discussion summarizing the results of the laboratory accuracy and bias based on contamination will be presented and any limitations on the use of the data will be described.

-Overall Accuracy/Bias: The results of instrument calibration, laboratory control samples and matrix spike recoveries will be reviewed and data will be qualified according to the data validation procedures cited on worksheet #36. A discussion summarizing the results of laboratory accuracy and any limitations on the use of the data will be described.

-Sensitivity: Data results will be compared to criteria provided in worksheet #15. A discussion summarizing any conclusions about the sensitivity of the analyses will be presented and any limitations on the use of the data will be described.

-Representativeness: Data representativeness will be assessed by collecting field duplicate samples. The field duplicates are by definition equally representative of a given point and space and time. Representativeness is a qualitative parameter which is dependent upon the proper design of the sampling program and proper laboratory protocol. Therefore, data representativeness will be satisfied by ensuring that samples were collected in accordance with this QAPP.

-Comparability: To ensure data comparability, sampling and analysis for all samples will be performed using standardized analytical methods and adherence to the quality control procedures outlined in the methods and this QAPP. Therefore, the data will be comparable.

-Reconciliation: The PQOs presented in worksheet #11 will be examined against the data quality to determine if the objectives were met. This examination will include a combined overall assessment of the results of each analysis pertinent to an objective. Each analysis will first be evaluated separately in terms of major impacts observed from data validation, data quality indicators, and measurement performance criteria assessments. Based on the results of these assessments, the quality of the data will be

QAPP Worksheet #37

Usability Assessment (Continued)

determined. Based on the quality determined, the usability of the data for each analysis will be determined. Based on the combined usability of the data from all analyses for an objective, it will be determined if the PQOs were met and whether project goals are being achieved. Conclusions will be drawn and any limitations on the usability of the data will be described.

-Completeness:

1. To calculate field precision: $RPD = 100 \times \left(\frac{|X_1 - X_2|}{(X_1 + X_2)/2} \right)$ where X1 and X2 are the reported concentrations for each duplicate or replicate.

2. Calculate completeness: Data completeness will be expressed as the percentage of valid data obtained from measurement system. In other words, every sample that was initially intended to be sampled, was sampled. For data to be considered valid, it must meet all the acceptable criteria including accuracy and precision, as well as any other criteria specified by the analytical method used. Therefore, all data points critical to the sampling program in terms of completeness will be validated by Region 9 according to the data assessment form listed in Worksheet #36.

Describe the evaluative procedures used to assess overall measurement error associated with the project:

EPA Region 6 or SERAS will determine if quality control data is within specification through validation process IIb.

Identify the personnel responsible for performing the usability assessment:

EPA Region 6.

Describe the documentation that will be generated during usability assessment and how usability assessment results will be presented so that they identify trends, relationships (correlations), and anomalies:

The final GC/MS report will describe the rationale for the data qualified and present any data limitations. The report will include a discussion of the accuracy, precision, representativeness, completeness and comparability of the data set and deviations from planned procedures and analysis. Tables will be prepared, including: a summary of samples collected and parameters analyzed; QC samples; and comparison of field duplicates, if analyzed.